DOCUMENT RESUME

ED 214 325 EC 141 532

AUTHOR Sarachan-Deily, Ann Beth
TITLE Deaf Readers' Comprehension of Individual Sentences.
PUB DATE Jun 80
NOTE 27p.; Condensed version of this paper presented at the International Convention of the Alexander Graham Bell Association of the Deaf (Houston, TX, June 26, 1980).

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Deafness; Elementary Secondary Education; *Recall (Psychology); *Semantics; *Sentences; Written Language

ABSTRACT

To examine syntactic and semantic differences between the written language of deaf and hearing persons, 30 deaf students (10 Ss were 10 to 12 years old, 10 Ss 13 to 15, and 10 Ss 16 to 18) were asked to recall sentences. Ss' recall was compared to that of hearing control Ss matched for age. More than half (59.8%) of the total number of sentences recalled by deaf Ss violated rules of English grammar, syntax, or both; while only 9.7% of hearing Ss' errors did so. Deaf Ss also made more recall errors than control Ss. However, deaf Ss could use the semantic relations in English sentences as well as the hearing Ss did to aid in recall, suggesting that the deaf are able to take advantage of semantic information and coding strategies for processing a sentence whether or not these relations are realized in their syntactic rules. (CL)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED214325

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

SCOPE OF INTEREST NOTICE
The ERIC Facility has assigned this document for processing to: EC PS
In our judgement, this document is also of interest to the clearinghouses noted to the right. Indexing should reflect their special points of view. CS

Deaf Readers' Comprehension of Individual Sentences

by

Ann Beth Sarachan-Deily, Ph.D.
Program in Communication Disorders
College of Saint Rose
Albany, New York 12203

A condensed version of this paper was presented at the International Convention of the Alexander Graham Bell Association of the Deaf, in Houston, Texas, as part of a Symposium, "Deaf Reader's Comprehension of Written Text," on June 26, 1980.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Ann Beth Sarachan-Deily
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

EC 141532

Abstract

The deaf develop language skills later than and in a different manner than the hearing do. Evidence from this study indicates that the deaf develop syntactic patterns, constructions, and processing abilities for language which differ from those used by the hearing, but develop similar semantic patt erns and processing abilities to the hearing. The development of early visual, gestural systems of semantic representation and implications for teaching reading to the deaf are discussed.

INTRODUCTION

Over the past dozen years, researchers (e.g., Goodman, 1967; Smith, 1971, 1973, 1975, 1977; Goodman and Goodman, 1977; Gibson and Levin, 1975; Wolf, 1977; etc.) have argued that reading involves psycholinguistic and cognitive activities, as well as visual ones. Similar to understanding speech, reading comprehension is an active psycholinguistic process dependent upon an adequate base of syntactic and semantic rules to help translate surface structure into meaningful information. The readers' psycholinguistic knowledge helps them to organize, process, and predict meaning from the visual information presented in printed sentences. This information is integrated, coordinated, and given a meaningful structure by their linguistic rule system.

Readers develop strategies to relate what they read to their linguistic base, to rapidly predict or recognize meaning consistent with these rules, and then to continue reading to ascertain that the prediction or recognition is an accurate reconstruction of the intended written message. In this way, readers use their base of linguistic knowledge, constraints, and redundancies to obtain meaning from the surface structure cues in print in a parallel fashion to their strategy for obtaining meaning from the surface structure cues in oral speech.

When we teach reading, of course, we presume a preexisting, intact, and adequately functioning linguistic system. But, as Truax (1978) has pointed out, children with hearing losses may not be able to supply the necessary linguistic prerequisites for reading. Indeed, as we know, studies (e.g., Furth, 1966a; Di Francesca, 1972; Conrad, 1977; etc.) have indicated that deaf students generally do not reach the same levels of reading achievement

or read as efficiently as hearing children. The role of the child's language structures for successful reading should not be underestimated.

According to current psycholinguistic theory, language is learned (in normally-hearing children) through a pairing of certain auditory sequences with the children's developing cognitive or environmental experiences. Gradually they learn an oral representation for things in their environment, and they learn to label, categorize, and code cognitive events for future use. For this to occur, there needs to be a continuous coordination between children's growing linguistic and cognitive systems.

By the nature of their sensory deficit, congenitally deaf infants cannot hear the auditory linguistic input from their immediate environment and cannot pair the linguistic input with their growing cognitive experiences. Whereas hearing children are continuously bombarded with auditory stimulation from the time they are born, deaf children only receive auditory language stimulation from the time their deafness is diagnosed and they are fitted with hearing aids. Unfortunately, there are still reported delays of up to 60 months until audiological assessment (Shah, Chandler, and Dale, 1978). Earlier than this, hearing-impaired children are limited to visual and/or tactile stimulation to associate with events in their environment. Frequently they develop an early visual or tactile representation for these cognitive experiences, as they either learn American Sign Language (ASL) another non-English (manual) language, or construct idiosyncratic communication systems.

It has been supposed that the linguistic base of deaf children may be different from that of normally-hearing children. Earlier studies (e.g., Templin, 1950; Myklebust, 1964, 1967; Simmons, 1962; Brannon, 1966; Brannon

and Murry, 1966; Elliott, Hirsh, and Simmons, 1967; Tervoort, 1967; etc.) described the surface structure of deaf subjects' written language, and they found it "inferior" to that of comparably-aged hearing subjects. Relying on such dependent measures as sentence length, sentence complexity, type-token ratios, frequency of parts of speech, and word orders, these studies concluded that the deaf subjects used a more rigid word order, repeated several basic stereotyped sentence patterns, and wrote shorter sentences, with a predominance of nouns and verbs.

More recently, there have been attempts to go beyond the analysis of immediate constituents and observed surface structure performance and to make inferences about the generative linguistic abilities that account for this performance. It has been reported that the deaf seem to have more difficulty with inflectional and derivational rules (Cooper, 1967; Raffin, Davis and Gilman, 1978; Crandall, 1978), the passive voice (Woodward, 1967; Tervoort, 1970; Power and Quigley, 1973; Presnell, 1973; etc.), certain verb units (Quigley, Montanelli, and Wilbur, 1976), relativized sentences (Quigley, Smith, and Wilbur, 1974), question formation (Quigley, Wilbur, and Montanelli, 1974), complementation (Quigley, Wilbur, and Montanelli, 1976; Jones and Quigley, 1979), pronominalization (Wilbur, Montanelli, and Quigley, 1976), conjunction (Wilbur, Quigley, and Montanelli, 1975), and negation (Quigley, Montanelli, and Wilbur, 1974) than the hearing. Some of these processes may follow a similar developmental pattern for hearing and deaf subjects, but be significantly delayed for deaf subjects. The processes of negation, conjunction, and question formation, for example, for older (18 year old) hearing-impaired children has been reported as similar to younger (10 year old) hearing children (Quigley, Montanelli, and Wilbur, 1974, 1976).

Quigley and associates have also reported that "deviant syntax," i.e., incorrect syntactic patterns not found in the language of hearing children, exists in deaf children's language production of relativized sentences, conjoined sentences, complement structures, questions, and their use of verbal auxiliaries, when using stimuli from the Test of Syntactic Abilities (Quigley, Steinkamp, Power, and Jones, 1979). None of these studies examined the sentential semantic structures or semantic relationships resulting from the reported syntactic differences.

An earlier series of studies by this author indicated that deaf subjects, ages 15-19, recalled sentences with grammatical structures that violated rules of English syntax, e.g., deletion of major sentence nodes, agrammatical word order, incorrect derivational and inflectional endings, etc., significantly more frequently than did hearing subjects (Sarachan, 1971, 1972; Sarachan-Deily and Love, 1974). These studies tested deaf subjects who were either trained manually (ASL) or in the Rochester method (i.e., lipreading, fingerspelling, and oral speech), but who did not have formal preschool experience or hearing aid usage prior to entering residential schools for the deaf at age five. Similar results were later found with orally-trained deaf subjects who did have documented formal oral preschool and hearing aid usage from at least three years of age or earlier (Deily, 1977).

It has been suggested (Menyuk, 1969; Mc Neill, 1970; Slobin and Welsh, 1973; Carrow, 1974; Schwartz and Daly, 1976; etc.) that sentence imitation can give valuable linguistic information concerning language. We tend to recall sentences that exceed immediate short-term memory span by using our linguistic rule system to organize and represent sentential content. Since

we recall sentences and meaningful language material differently than we recall lists of unrelated words, it is assumed that the semantic and syntactic rules of language provide an internal structure to aid our recall for linguistic materials. This is especially true for delayed recall of material, because the effect of the external model or stimulus becomes weaker over time, creating the need for some form of internal symbolic representation (Prutting and Connolly, 1976). It has been reported that information about a child's linguistic system can often be derived from the number and types of errors he or she makes in recalling stimulus sentences (Schwartz and Daly, 1976).

The nature of the semantic relationships in the written sentences of the deaf is not clear. The purpose of this study is to examine syntactic and semantic differences between the written language of deaf and hearing subjects. Since studies in the literature have demonstrated that people use syntactic and semantic relations in sentences to facilitate and organize sentences in recall, it was expected that examination of sentence recall by deaf and hearing subjects would reflect their use of basic syntactic and semantic structures. It is probable that the lack of early auditory exposure to English syntax in the deaf may result in impaired syntactic performance or inability to make use of syntactic strategies for recalling English sentences, when compared with hearing children. If, however, the gestural systems or other early language systems acquired by deaf children are sufficient for adequate coding of their growing cognitive experiences, it would be expected that they could learn and retain adequate semantic knowledge of their language through speech or reading.

METHODOLOGY

Population

The population sample for this study consisted of 60 subjects. Thirty subjects were congenitally and profoundly deaf and trained at a purely oral school for the deaf. All deaf subjects wore hearing aids and had the benefit of aural amplification and preschool oral training from at least three years of age. The other 30 subjects were normally-hearing subjects. Twenty subjects, ten from each population were in the age range 10 - 12; twenty subjects, ten from each population, were in the age range 13 - 15; and, twenty subjects, ten from each population, were in the age range 16 - 18. Within each population, an equal number of males and females were tested.

Method

Each subject was given written instructions and an answer sheet. The instructions indicated that he or she would see 12 sentences, one at a time, flashed on a movie screen. Each subject was instructed to read the sentence, but only one time, and then to look at the number on the answer sheet in front of him or her. Starting with this number the subject was instructed to, "take away three, then, take away three more, and keep taking away by three's until tapped on the shoulder." "Taking away by three's" was adapted from Peterson and Peterson (1959), and was used as a form of rehearsal interference and to delay recall. When the subject was tapped on the shoulder, he or she wrote down the sentence on the answer sheet. All subjects were told that they could guess.

Each subject was given a chance to ask questions about the task and then given four warm-up sentences to practice on. These were scored im-

mediately. Each subject then had a second chance to ask questions about the task.

All subjects controlled their own reading rates by pressing a remote controlled "button" to advance the slide when they finished reading the sentence. Subjects were allowed 15 seconds to do the subtraction task, before being tapped on the shoulder, and then had as much time as desired to write the sentence. All words used in the sentences were from the Silverman-Dresner and Guilfoyle (1972) norms for words known by deaf children at age eight, at 89 schools for the deaf across the country. The stimulus sentences varied in length from five to nine words, and in syntactic construction from active, to passive, to negative, to passive-negative, to ensure a variety of sentences.

Scoring:

All recalled sentences were initially divided into two groups: (1) those recalled with errors; and (2) those recalled without errors. The first group of sentences was further divided into one of five mutually exclusive error categories, initially suggested by Kolers' (1970) study of reading, to help evaluate the results. The five error categories were:

Error 1 -- errors resulting in a sentence which was both syntactic and meaningful, i.e., minor deletions, additions, or substitutions;

Error 2 -- errors resulting in a sentence which was not syntactic but preserved the meaning;

Error 3 -- errors resulting in a sentence which was anomalous (violated semantic constraints), but was syntactic;

Error 4 -- errors resulting in a sentence which was neither syntactic nor meaningful; and,

Error 5 -- deletion of half or more of the sentence.

Any sentence recalled with Error types 1, 2, 3, or 4 was further analyzed with respect to its semantic equivalency to the original stimulus sentence.

The criteria used to determine if the syntax or semantic content of the recalled sentence was acceptable were whether or not the resulting sentence would be judged as likely to be heard in spoken English, or if it would be "intuitively" grammatical to a native speaker of English. The criterion for semantic equivalency was whether or not the resulting sentence could be understood as having the same meaning as the model sentence. Three independent judges rated each sentence as to its syntactic and semantic acceptability and as to its semantic equivalency. Reliability coefficients (Scott, 1955) were obtained for acceptability (r_{deaf} = .97 and $r_{hearing}$ = .99) and for equivalency (r_{deaf} = .87 and $r_{hearing}$ = .94), indicating a high degree of agreement between judges and relatively unambiguous criteria.

RESULTS

Table 1 about here

All errors made by hearing and deaf subjects were summarized initially by error type, age level, and population. Descriptive analyses of the data reveals that most of the hearing subjects' errors (specifically 80.6%) of the total number of errors committed by hearing subjects resulted in sentences categorized as Error 1, i.e., sentences containing minor recall errors of addition, deletion, or substitution. Only four percent (4.3%) of

TABLE 1

Number and Types of Sentence Errors for

Hearing and Deaf Subjects for Three Age Levels

Population	Error Type I	II	III	IV	V	Total Errors
Hearing						
10-12 years n = 10	26 (n=1)[a]	3 (n=2)	2 (n=1)	1	4 (n=4)	35
13-15 years n = 10	23 (n=7)	0	1	0	3 (n=2)	22
16-18 years n = 10	26 (n=9)	1	1	0	2 (n=2)	30
Total Errors for Error Type	75 (n=17)	4 (n=3)	4 (n=3)	1 (n=1)	9 (n=8)	Total Errors
% of Total Errors/Popn.	80.6%	4.3%	4.3%	1.1%	9.7%	for Hearing Ss=93
Deaf						
10-12 years n = 10	23 (n=8)	33 (n=10)	2 (n=2)	11 (n=7)	8 (n=5)	80
13-15 years n = 10	16 (n=8)	24 (n= 9)	2 (n=2)	6 (n=4)	4 (n=4)	53
16-18 years n = 10	13 (n=8)	28 (n= 9)	0	4 (n=3)	10 (n=6)	55
Total Errors for Error Type	52 (n=24)	85 (n=28)	4 (n=4)	21 (n=14)	22 (n=15)	Total Errors
% of Total Errors/Popn.	28.2%	46.2%	2.2%	11.4%	11.4%	for Deaf Ss=184

[a]Numbers in parentheses indicate the number of subjects committing this type of error.

the hearing subjects' errors were Error 2's or Error 3's, and all of these sentences were produced by just three hearing subjects. Only 1.1% of the hearing subjects' errors were categorized as Error 4, i.e., as sentences violating both English syntactic and semantic rules.

On the other hand, when the deaf subjects' errors were analyzed, just 28.2% of the sentences recalled with errors were Error 1's, but almost half (46.2%) of the total number of sentences recalled with errors by the deaf subjects were categorized as Error 2, and almost all deaf subjects (28 subjects out of the 30 subjects tested) produced sentences classified as violating the rules of grammar. Two percent (2.2%) of the deaf subjects's errors resulted in Error 3 sentences, and almost 12% (11.4%) of their errors resulted in Error 4 sentences.

When the performance of the deaf and hearing subjects is compared, it can be seen that more than half (59.8%) of the total number of sentences recalled with errors by the deaf subjects violated rules of English grammar, semantics, or both. Only 9.7% of the hearing subjects' errors violated English grammatical and/or semantic constraints, strongly suggesting that the psycholinguistic sentential relations in English are not used in the same manner by deaf and hearing subjects when recalling sentences.

Further, the relatively few recall errors produced by hearing subjects fairly consistently resulted in sentences classified as Error 1, i.e., minor errors of inexact recall. However, when the same sentence stimuli were presented to the deaf subjects, at the same age ranges, there were many recall errors produced, and these errors were distributed over the five types of error categories with Error 2 (errors violating English grammar) being the most predominant. A t test between means (Guilford and Fruchter,

1978) was performed on the numbers of sentences with errors violating English grammar (Error 2) between deaf and hearing populations. As expected, the deaf subjects made significantly more syntax errors than hearing subjects did (t 58 = 7.93, $p < .001$).

Inspection of the data reveals that there is practically no variability between the performance of the hearing and deaf subjects when sentences recalled with semantic violations are examined. Both the hearing and deaf subjects produced only four sentences classified as Error 3, suggesting that the deaf subjects, could take advantage of the semantic relations in English to aid recall, in a similar manner to the hearing subjects.

Table 2 about here

All sentences recalled with Error types 1, 2, 3, or 4, by either deaf or hearing subjects, were totalled and re-examined with respect to their semantic equivalency to the original stimulus sentence. Sentences recalled with Error 5 (deletion of half or more of the sentence) were necessarily omitted from this analysis. Inspection of this data for hearing subjects reveals that 52.4% of their inaccurately recalled sentences preserved the meaning of the original sentence, while 47.6% of their sentences did not. Although the deaf subjects produced a greater overall number of sentences with errors, 54.9% of their inaccurately recalled sentences were semantically equivalent to the original stimulus, and 45.1% were not equivalent to the model; these differences were not significant ($p < .001$). Thus, despite the fact that the deaf subjects produced more sentences violating the rules of English syntax and/or semantics than the hearing subjects did, deaf subjects were <u>equally</u> likely to maintain accurate semantic content or

TABLE 2

Frequency (and Percentage) of
Semantically Equivalent and Nonequivalent Sentences
Produced by Hearing and Deaf Subjects

Population	Sentences Recalled With Errors I, II, III, IV		
	Semantically Equivalent	Semantically Nonequivalent	Total
Hearing n = 30	44 (52.4%)	40 (47.6%)	84 (100%)
Deaf n = 30	89 (54.9%)	73 (45.1%)	162 (100%)
Total	133	113	246

"gist" (Fillenbaum, 1968) of inaccurately recalled sentences as hearing subjects were.

DISCUSSION

As expected, results from this study indicated that these orally-trained deaf subjects, ages 10 - 18, could not take advantage of the syntactic rules in English to aid in the organization and recall of sentences as well as the hearing subjects did. Deaf subjects produced sentences violating English grammar (Error 2) significantly more often than hearing subjects; 46.2% of the deaf subjects' errors were of this type. Somewhat surprisingly, the deaf subjects could use the semantic relations in English sentences as well as the hearing subjects did to aid in recall. There were no differences between the number of sentences recalled violating English semantic constraints (Error 3) between deaf and hearing subjects. Furthermore, accuracy for the semantic content of a sentence did not seem to be related to hearing status; deaf and hearing subjects were equally likely to produce sentences that preserved the original semantic content of the stimulus sentence, even when the syntactic and/or semantic relations of the sentence were not preserved. This suggests that the deaf are able to take advantage of semantic information and coding strategies for processing a sentence whether or not these relations are realized in their syntactic rules.

As previously stated, depending on when the deafness is diagnosed, deaf children often experience a significant delay in English auditory language exposure, when compared with normally-hearing children. They also experience a lesser contact with and ability to use the aural stimulation from their parents to relate to their maturing cognitive and environmental ex-

periences. And, moreover, their primary language stimulation most frequently occurs through a different modality from normally-hearing children. Rather than learning language naturally from birth and from their environment, during their "optimal" or "critical" (Lenneberg, 1967) years for syntactic language acquisition, deaf children must frequently be taught English syntax (remedially) at some later age. Because there are so many differences in the initial early English language learning experience between deaf and hearing children, it is not too surprising that there are consequences for deaf children's reliable use of the syntactic rules of English. Even by age 18, the deaf subjects in this study still seemed to use some different syntactic rules that the hearing subjects did.

Recent studies have confirmed that conventional Sign language is indeed a language (c.f. Wilbur, 1979, for a comprehensive review and elaboration of these studies), and when it is introduced from birth, such as with deaf children of deaf parents, it may play a similar role to oral language in the development of cognition. It has been reported (Mc Intyre, 1977; Wilbur, 1979) that deaf children exposed to American Sign Language (ASL) from birth or deaf children simultaneously exposed to both ASL and English from birth (Wilbur and Jones, 1974; Prinz and Prinz, 1979) seem to pass through semantic stages and express all the semantic linguistic relations (Bloom, 1970, 1973) reported for hearing children learning oral languages.

But the development of these similar semantic functions in deaf children is not limited to those deaf children exposed to ASL. It has also been observed that young deaf children, without exposure to ASL or to any other obvious gesture language in their environment, develop an early spontaneous idiosyncratic gestural language, apparently based on their need to com-

municate (Myklebust, 1954; Furth, 1966; Tervoort, 1967; Goldin-Meadow and Feldman, 1975). There is some evidence (Goldin-Meadow and Feldman, 1975) that even without systematic exposure to an obvious linguistic model, the development of this (symbolic) gestural communication system may contain early semantic stages similar to those that hearing children have been shown to experience and pass through while learning their verbal language. These authors (Goldin-Meadow, et al.) have hypothesized that deaf children may be able to abstract out lexical symbols from the actions they observe in their environment and use these symbols to represent growing cognitive schema in a similar manner to the hearing children's abstracting symbolic representation from sound. These early "esoteric" spontaneous gesture systems and combinations have also been shown to demonstrate similar pragmatic intentions (Skarakis and Prutting, 1977; Curtiss, Prutting, and Lowell, 1979; Wilbur, 1979) to those systems and combinations described and identified in the young hearing child's early communication (Dore, 1974; Greenfield and Smith, 1976)

It is suspected that the deaf child's early gestural communication systems, whether idiosyncratic or formal symbols, may adequately perform the functions of a sound-based symbolic system for him or her, as well as providing an adequate prelinguistic cognitive base for later semantic and pragmatic development. It should be recalled that hearing children develop gestures as normal precursors for spoken language, and it is suspected that these gestures may be prerequisites for full symbolic language representation to develop (Bates, 1976). The semantic/pragmatic foundation of early gesture systems is probably sufficient to generalize adequately to English for later <u>semantic</u> coding, representation, and sentence processing.

However, the syntax of these early gestural communication systems is often idiosyncratic; it is rarely an English syntax, which still must be taught later. And, if the optimal time for learning language ends at an early age, as Lenneberg (1967) has stated, then deaf children may have trouble learning their English-based syntax at this later age. Learning English syntax appears to be very difficult for deaf children. This may be because their first way of communicating, i.e., through spontaneously developing gestures, is not a fully articulated, or conventional symbol system with rules of ordering, and that there are difficulties in later transferring their system to the syntactic rules of English. Deaf subjects, from ages 7 - 18, seem to show developmental trends in acquiring their semantic relations, but not in acquiring their syntactic relations (Deily, 1977).

Even though all of the deaf children in this study were trained in a strictly oral school which prohibits the use of any visual language or signs, these children, at least until receiving their hearing aids, did not have an oral environment during their earliest months when so much cognitive learning and growth takes place. We must face the possibility that the reported differences cannot be ascribed to the training received by the deaf subjects, but rather to the fact that the training is necessary. Differences in the initial acquisition of English between the two groups of subjects when they were young may have created differences in their reliable use of English syntactic rules when they were older. There may be an interference when later learning English syntactic rules or, perhaps, the "critical" or "optimal" period for acquiring native syntactic competence may have been over. Perhaps all the modern instructional techniques, books, and methods may only have limited success and effectiveness when started at age two or three.

In the course of acquiring language, children internalize rules and later operate in accordance with these rules when speaking, comprehending, and processing language material. Implications exist for reading. As deaf children seem to have more difficulty utilizing the syntactic information in English sentences to aid in coding and processing sentences for retention than comparably-aged hearing children do, perhaps flexibility in selecting early reading methodologies is necessary. Semantic information seems to be very important when deaf children process a written sentence. Hence, the early use of paraphrase, reading-for-meaning, and other similar strategies placing primary emphasis on this component would take maximum advantage of these strengths and the apparent stability of the deaf children's semantic system. As Gormley and Franzen (1978) and Mc Gill-Franzen and Gormley (1980) have recently suggested, emphasizing the understanding or "gist" of an author's intended message may give better reading comprehension results than initially stressing control over syntactic structures, which may be difficult for some deaf children to achieve.

However, since <u>both</u> semantic and syntactic considerations are important for achieving full control of reading, it is also necessary later to teach syntactic constructions and attempt to make work endings, tenses, and other syntactic features perceptually distinctive and semantically relevant for deaf children. Many deaf children are able to omit certain derivational or inflectional endings from their oral and written speech and still retain sufficient semantic content to transmit an intended message. This study has documented that resulting "agrammaticisms" remain in deaf students' written language, despite varied teaching techniques, through the oldest ages tested (17 - 19 years). If deaf students cannot utilize the syntactic rules and

endings to help process sentences, they cannot extract precise meanings from these sentences, and total comprehension is weakened. Too often hearing-impaired children are said to have just a "reading" problem, when, in fact, they really have a broader "language" problem. Especially on the post-elementary level, continuing efforts to develop the English syntactic rule systems of deaf students should be maintained, to help make the perceptual characteristics of syntax salient for them.

From the evidence in this study, it seems apparent that the syntactic ability of mature deaf subjects in English differs from that of comparably-aged hearing subjects, as anticipated. The deaf develop their language skills later than, and in a different manner from the hearing, and, as a result, they seem to develop syntactic patterns, constructions, and processing abilities for language which are different from those normally used by hearing subjects. Contrary to expectations, however, neither the deaf subjects' sentential semantic structures nor their semantic processing of written language differed significantly from the hearing subjects. Possibly this similarity is due to deaf children's developing an early visual, gestural system of semantic representation, which may adequately generalize later to English. Performance on a memorial task which requires use of both syntactic and semantic rule-knowledge appears to demonstrate some of these differences. Thus, it seems important, initially, to use the semantic areas when teaching reading and language skills.

REFERENCES

Bates, E. Language and Context: The Acquisition of Pragmatics. N.Y.: Academic Press, 1976.

Bloom, L. Language Development: Form and Function In Emerging Grammars. Cambridge, Mass.: MIT Press, 1970.

Bloom, L. One Word at a Time: The Use of Single Word Utterances Before Syntax. The Hague: Mouton, 1973.

Brannon, J. B. The speech production and spoken language of the deaf. Language and Speech, 1966, 9, 127-135.

Brannon, J. B. and Murry, T. The spoken syntax of normal, hard of hearing, and deaf children. Journal of Speech and Hearing Research, 1966, 9, 604-610.

Carrow, E. A test using elicited imitation in assessing grammatical structure in children. Journal of Speech and Hearing Disorders, 1974, 39, 437-444.

Conrad, R. The reading ability of deaf high school leavers. British Journal of Educational Psychology, 1977, 47, 138-148.

Cooper, R. L. The ability of deaf and hearing children to apply morphological rules. Journal of Speech and Hearing Research, 1967, 10, 77-82.

Crandall, K. E. Inflectional morphemes in the manual English of young hearing-impaired children and their mothers. Journal of Speech and Hearing Research, 1978, 21, 372-386.

Curtiss, S., Prutting, C. A., and Lowell, E. L. Pragmatic and semantic development in young children with impaired hearing. Journal of Speech and Hearing Research, 1979, 22, 534-553.

Deily, A. B. Syntactic and semantic performance of congenitally-deaf and normally-hearing subjects on a sentence recall task. Unpublished Ph.D. dissertation, State Univ. of New York at Albany, 1977.

Di Francesca, S. Academic Achievement Test Results Of A National Testing Program for Hearing-Impaired Students: Washington, D.C.: Gallaudet College, Office of Denographic Studies, 1972.

Dore, J. A pragmatic description of early language development. Journal of Psycholinguistic Research, 1974, 3, 343-350.

Elliott, L. L., Hirsh, J. J., & Simmons, A. A. Language of young hearing impaired children. Language and Speech, 1967, 10, 141-158.

Furth, H. G. A comparison of reading test norms of deaf and hearing children. American Annals of Deaf, 1966, 111 461-462. (a)

Furth, H. G. Thinking Without Language: Psychological Implications of Deafness. N.Y.: Free Press, 1966. (b)

Gibson, E. J. and Levin, H. The Psychology of Reading. Cambridge, Mass.: MIT Press, 1975.

Goldin-Meadow, S. and Feldman, H. The creation of a communication system: a study of deaf children of hearing parents. Sign Language Studies, 1975, 8, 225-236.

Goodman, K. S. Reading: A psycholinguistic guessing game. Journal of the Reading Specialist, 1967, 6, 126-135.

Goodman, K. S. and Goodman, Y. M. Learning about psycholinguistic processes by analyzing oral reading. Harvard Educational Review, 1977, 47, 317-333.

Gormley, K. and Franzen, A. Why can't the deaf read? American Annals of the Deaf, 1978, 123, 542-547.

Greenfield, P. and Smith, J. The Structure of Communication in Early Language Development. N.Y.: Academic Press, 1976.

Guilford, J. P. and Fruchter, B. Fundamental Statistics in Psychology and Education (6th ed.). N.Y.: McGraw Hill Book Co., 1978.

Jones, M. L. and Quigley, S. P. The acquisition of question formation in spoken English and ASL by two hearing children of deaf parents. Journal of Speech and Hearing Disorders, 1979, 44, 196-208.

Kolers, P. A. Three stages of reading. In F. Smith, Psycholinguistics and Reading. N.Y.: Holt, Rinehart, & Winston, 1973.

Lenneberg, E. H. Biological Foundations of Language. N.Y.: Wiley, 1967.

Mc Gill-Franzen, A. and Gormley, K. The influence of context on deaf readers' understanding of passive sentences. American Annals of the Deaf, 1980, 125, 937-942.

Mc Intyre, M. The acquisition of ASL hand configurations. Sign Language Studies, 1977, 16, 247-266.

Mc Neill, D. The Acquisition of Language: The Study of Developmental Psycholinguistics. N.Y.: Harper & Row, 1970.

Menyuk, P. Sentences Children Use. Cambridge, Mass.: MIT Press, 1969.

Myklebust, H. Auditory Disorders in Children. New York: Grune & Stratton, 1954.

Myklebust, H. R. The Psychology of Deafness: Sensory Deprivation, Learning, & Adjustment (2nd ed.). N.Y.: Grune & Stratton, 1964.

Myklebust, H. R. The measurement of language. In Proceedings of International Conference on Oral Education of the Deaf, Vol. II. Washington, D.C.: Alexander G. Bell Association for the Deaf, Inc., 1967.

Peterson, L. R. and Peterson, M. J. Short-term retention of individual verbal items. Journal of Experimental Psychology, 1959, 58, 193-198.

Power, D. J. and Quigley, S. P. Deaf children's acquisition of the passive voice. Journal of Speech and Hearing Research, 1973, 16, 5-12.

Presnell, L. M. Hearing impaired children's comprehension and production of syntax in oral language. Journal of Speech and Hearing Research, 1973, 16, 12-21.

Prinz, P. and Prinz, E. Simultaneous acquisition of ASL and spoken language. Sign Language Studies, 1979, 25, 283-296.

Prutting, C. and Connolly J. Imitation: A closer look. Journal of Speech and Hearing Disorders, 1976, 41, 412-422.

Quigley, S. P., Montanelli, D., and Wilbur R. B. An examination of negation in the written language of deaf children. Unpublished manuscript, Institute for Research on Exceptional Children, Univ. of Illinois at Urbana - Champaign, 1974.

Quigley, S., Montanelli, D. and Wilbur, R. B. Auxiliary verbs in the language of deaf students. Journal of Speech and Hearing Research, 1976, 19, 536-550.

Quigley, S. P., Smith, N. L., and Wilbur, R. B. Comprehension of relativized sentences by deaf students. Journal of Speech and Hearing Research, 1974, 17, 325-341.

Quigley, S. P., Steinkamp, M. W., Power, D. P., and Jones, B. W. Test of Syntactic Abilities. Oregon: Dormac, Inc., 1979.

Quigley, S., Wilbur, R. B., and Montanelli, D. Complement structures in the written language of deaf students. Journal of Speech and Hearing Research, 1976, 19, 448-457.

Quigley, S. P., Wilbur, R. B., and Montanelli, D. Question formation in the language of deaf students. Journal of Speech and Hearing Research, 1974, 17, 699-713.

Raffin, M. J. M., Davis, J. M., and Gilman, L. A. Comprehension of inflectional morphemes by deaf children exposed to a visual English sign system. Journal of Speech and Hearing Research, 1978, 21, 387-400.

Sarachan, A. B. An attempt to probe deep structure of the deaf. Unpublished M.A. thesis, Vanderbilt University, 1971.

Sarachan, A. B. A further analysis of deep structures of the deaf. Unpublished M.S. thesis, Vanderbilt University, 1972.

Sarachan-Deily, A. B. and Love, R. J. Underlying rule structure in the deaf. Journal of Speech and Hearing Research, 1974, 17 689-698.

Schwartz, A. H. and Daly, D. A. Some explicit guidelines for constructing and scoring elicited imitation tasks. Language, Speech, and Hearing Services in Schools, 1976, 7, 33-40.

Scott, W. A. Reliability of content analysis: The case of nominal scale coding. Public Opinion Quarterly, 1955, 19, 321-325.

Shah, C. P., Chandler, D., and Dale, R. Delay in referral of children with impaired hearing. Volta Review, 1978, 80, 206-215.

Silverman-Dresner, T. and Guilfoyle, G. R. Vocabulary Norms for Deaf Children. Washington, D.C.: Alexander G. Bell Association for the Deaf, 1972.

Simmons, A. A. A comparison of the typetoken ratio of spoken and written language of deaf and hard of hearing children. Volta Review, 1962, 64, 417-421.

Skarakis, E. A. and Prutting, C. A. Early communication: Semantic functions and communicative intentions in the communication of the preschool child with impaired hearing. American Annals of the Deaf, 1977, 122, 382-391.

Slobin, D. and Welsh, C. Elicited imitation as a research tool in developmental psycholinguistics. In C. Ferguson and D. Slobin (Eds.), Studies of Child Language Development. N.Y.: Holt, Rinehart, and Winston, 1973.

Smith, F. Psycholinguistics and Reading. N.Y.: Holt, Rinehart, and Winston, 1973.

Smith, F. Comprehension and Learning: A Conceptual Framework for Teachers. N.Y.: Holt, Rinehart, & Winston, 1975.

Smith, F. Making sense of reading -- and of reading instruction. Harvard Educational Review, 1977, 47, 386-395.

Smith, F. Understanding Reading: A Psycholinguistic Analysis of Reading and Learning to Read (2nd ed.). N.Y.: Holt, Rinehart, and Winston, 1978.

Templin, M. C. The Development of Reasoning in Children with Normal and Defective Hearing. Minneapolis: University of Minneapolis Press, 1950.

Tervoort, B. T. Esoteric symbolism in communication behavior of young deaf children. American Annals of the Deaf, 1967, 106, 436-480.

Tervoort, B. T. Language development of deaf children: Some results of an 8 year project. In Proceedings of International Conference on Oral Education of the Deaf (Vol. II). Washington, D.C.: Alexander G. Bell Association for the Deaf, Inc., 1967.

Tervoort, B. The understanding of passive sentences by deaf children. In G. B. F. D'Arcais and W. J. M. Levelt (Eds.), Advances in Psycholinguistics. Amsterdam: North-Holland Publishing Co., 1970.

Truax, R. Reading and language. In R. R. Kretschmer and L. W. Kretschmer Language Development and Intervention with the Hearing Impaired. Baltimore, Md.: University Park Press, 1978.

Wilbur, R. B. American Sign Language and Sign Systems. Baltimore, Md.: University Park Press, 1979.

Wilbur, R. B. and Jones, M. Some aspects of the bilingual/bimodal acquisition of sign language and English by three hearing children of deaf parents. In M. La Galy, R. Fox, and A. Bruck (Eds.), Papers from the Tenth Regional Meeting of the Chicago Linguistic Society. Chicago, Illinois: Chicago Linguistic Society, 1974.

Wilbur, R. B., Montanelli, D., and Quigley, S. P. Proniminalization in the language of deaf students. Journal of Speech and Hearing Research, 1976, 19, 120-140.

Wilbur, R. B., Quigley, S. P., and Montanelli, D. Conjoined structures in the language of deaf students. Journal of Speech and Hearing Research, 1975, 18, 319-335.

Wolf, T. Reading reconsidered. Harvard Educational Review, 1977, 47, 411-429.

Woodward, H. M. Language structure and reading. In Proceedings of Initial Conference on Oral Education of the Deaf (Vol. II). Washington, D.C.: Alexander G. Bell Association for the Deaf, Inc., 1967.